

must there is at least one time
when ave rate = inst- rate

Oct 21-9:25 AM

24. find local extrema, inc, dec

$$y = (x^{1/3})(x+8)$$

$$y' = x^{1/3} \cdot 1 + (x+8) \cdot \frac{1}{3} x^{-2/3}$$

$$y' = \left(\sqrt[3]{x} + \frac{x+8}{3\sqrt[3]{x^2}} = 0 \right) 3\sqrt[3]{x^2}$$

$$3\sqrt[3]{x^3} + (x+8) = 0$$

$$3x + x + 8 = 0$$

$$4x = -8$$

$$x = -2$$

c.p.

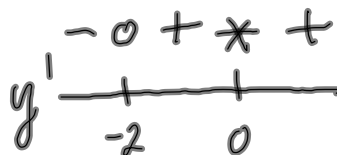
$$f' = 0$$

or

$$f' = \infty$$

$x=0$ is c.p.
 $y' = \infty$

$x=-2$ is c.p.



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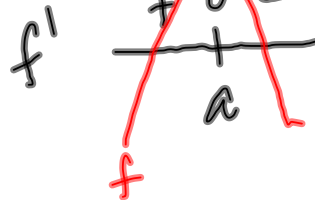
4.3. relation of f , f' and f'' (graphically)

if $f' > 0$, f increases

$f' < 0$, f decreases

$f' = 0$, f level (horiz tan)

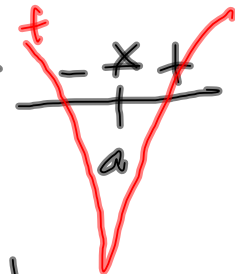
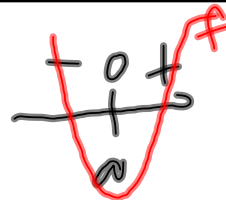
f has max
at $x=a$



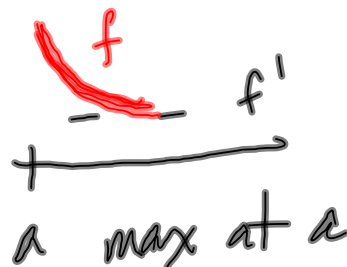
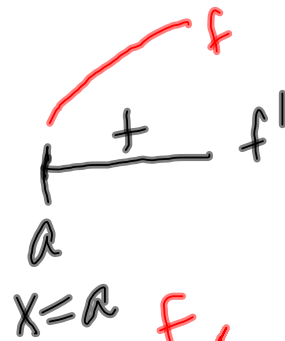
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f has min
at $x=a$

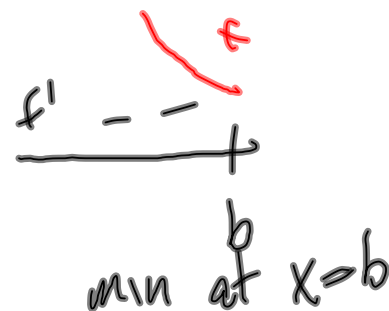
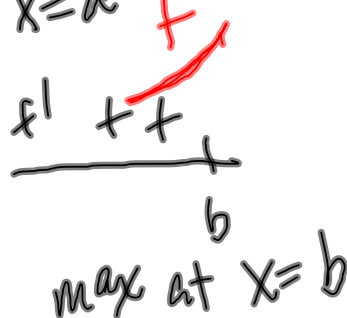
sign graph
of f'



left end pt
at $x=a$
min at



right
end pt
at $x=b$



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Ex

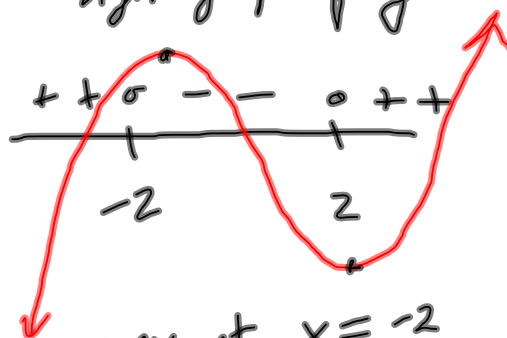
$$y = x^3 - 12x - 5$$

$$y' = 3x^2 - 12 = 0$$

$$3(x^2 - 4) = 0$$

$$3(x+2)(x-2) = 0$$

$$x = \pm 2$$

sign graph of y' max at $x = -2$ max is $y = 11$ min at $x = 2$ min is $y = -21$

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if $f'' > 0$, f' inc f concave upif $f'' < 0$, f' dec f concave down

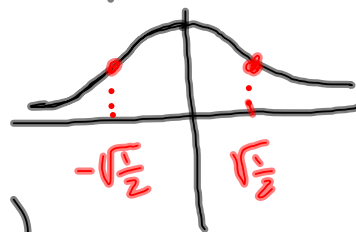
if f'' changes sign,
then f changes concavity
inflection point



Oct 21-9:58 AM

$y = e^{-x^2}$ find inflection pts, graph

$$y' = -2x \cdot e^{-x^2} \quad \begin{array}{c} y' + 0 - \\ \hline 0 \end{array}$$



$$y'' = -2x \cdot (-2xe^{-x^2}) + e^{-x^2}(-2)$$

$$= -2e^{-x^2}(-2x^2 + 1) = 0$$

↑
always pos

$$y'' + 0 - - 0 + +$$

$-\sqrt{1/2} \quad \sqrt{1/2}$

$$-2x^2 + 1 = 0$$

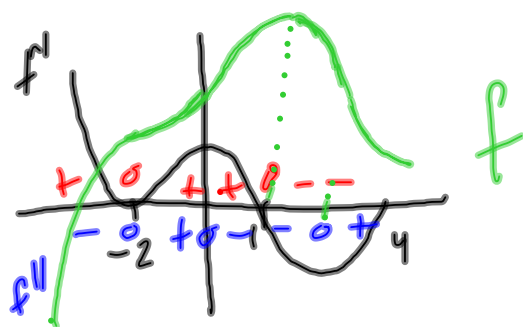
$$x = \pm\sqrt{1/2}$$

$$y = e^{-1/2} = \frac{1}{\sqrt{e}}$$

plug in original

Oct 21-10:06 AM

p209 Ex 4



Oct 21-10:19 AM